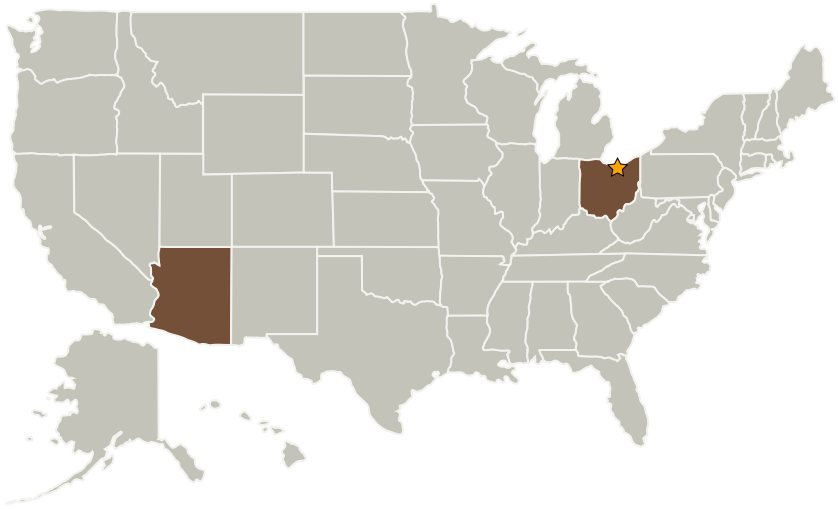
High Thermal Conductivity Functionally Graded Heat Sinks for High Power Packaging, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

This NASA SBIR Phase I program proposes the development of a high thermal conductivity (400 W/mK), low coefficient of thermal expansion (7-10 ppm/?K), and light weight (3-4 g/cm3) functionally graded material (FGM) heat sinks for microelectronic packaging applications. The uniquely defined ?FGM concept? pursued in this project uses a metallic package base that consists of a light metal matrix composite material to provide low thermal expansion and a high thermal conductivity functional core to cool the high power semiconductor die. The thermal performance of the heat sink is doubled by using the high thermal conductivity functional core bonded through the body of the heat sink.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Intertec Advanced Materials, Inc.	Supporting Organization	Industry	Tucson, Arizona

Primary U.S. Work Locations	
Arizona	Ohio

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Juan Sepulveda

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.6 Materials for Electrical Power Generation, Energy Storage, Power Distribution and Electrical Machines